

ENGINEERING REPORT
RED LIGHT RUNNING TRAFFIC MONITORING
SYSTEM

Intersection of:

State Route 509/ Marine View Dr. S at 7th Pl. S
Des Moines, WA

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I. INTRODUCTION

This engineering report is intended to provide justification for the installation of intersection safety cameras on State Route 509/ Marine View Dr. S at the intersection of 7th Pl. S, in Des Moines, Washington.

The intersection of SR 509/Marine View Dr. S and 7th Pl. S is located approximately 1.5 miles west of the Interstate-5. 7th Pl. S is the continuous westbound extension of S 216th St. SR 509/Marine View Dr. S is classified as Principal Arterial while 7th Pl. S is classified as a Minor arterial. SR 509/Marine View Dr. S is a 4-lane undivided roadway. The posted speed limit on SR 509/ Marine View Dr. S is 30 mph. 7th Pl. S is a 4-lane undivided roadway with a 25mph posted speed limit. The 2015 annual traffic report from Washington State Department of Transportation reported an average weekday traffic of 8,000 vehicles per day on the westbound and 23,000 vehicles per day south of the intersection of SR 509/ Marine View Dr. S & 7th Pl. S.

The area is generally urban with different government services, recreational facilities, downtown businesses and transit facilities. There is a traffic signal at the intersection of Marine View Dr. & S 223rd St, approximately 0.4 miles to the south; and a traffic signal at the intersection of S 216th St & 24th Ave S, approximately 1 miles to the east. A Location map indicating the intersection is provided below.



Figure 1: SR 509/ Marine View Dr. S & 7TH Pl. S Intersection Location

II. ENGINEERING REPORT

A. Intersection Crash History

The intersection crash history for the past 5 years is summarized in the table below. This information was provided by the City of Des Moines Police Department.

Table 1: City of Des Moines crash history at the intersection of SR 99 & Kent- Des Moines Rd categorized in crash types and crash severity types from 2011 to 2015

Year	Crash Totals	Crash Types					Crash Severity Types		
		Angle	Rear-End	Approach Turning	Side-Swipe	Other	Fatal	Injury	Property Damage
2015	5	0	2	0	3	0	0	2	0
2014	2	0	2	0	0	0	0	0	0
2013	2	1	0	1	0	0	0	0	0
2012	2	0	1	0	0	1	0	1	0
2011	2	0	1	0	0	1	0	1	0
Total	13	1	6	1	3	2	0	4	0

There are a total of 13 crashes at the intersection as indicated on the summary table. This equals to an average of 2.6 crashes per year. 2015 had the highest annual amount in the last 5 years. 4 crashed related injuries occurred in the 5 year time period.

B. Evaluation of Existing Signal Timings

Table 2: Existing programmed change intervals vs. calculated change intervals for the intersection of SR 509/ Marine View Dr & 7th Pl. S

	Phase 8 (WB)	Phase 4 (EB)	Phase 2 (NB)	Phase 6 (SB)
Proposed Monitored Approach?	No	No	Yes	Yes
Existing Programmed Yellow Interval, Sec.	4.0	4.0	4.0	4.0
Calculated Yellow Interval, Sec			3	3

The existing programmed intersection timings from Table 2 were obtained from the Washington State Department of Transportation. A copy of the timing chart is included in the Appendix. In general, the existing programmed Yellow change interval and the calculated yellow change intervals are summarized in Table 2.

The Yellow change intervals at this intersection were calculated based on the formula 1 found in *ITE's Determining Vehicle Signal Change and Clearance Intervals*.

$$\text{Change Interval} = Y = t + \left[\frac{v}{2(a + 32.2g)} \right]$$

Where:

t= reaction time, seconds

v= approach speed, feet/second

a= deceleration rate, feet/second²

g= approach grade, percent/100

For northbound & southbound approach:

The approach grade is relatively flat $g = 0\%$, reaction time of 1.0 second, deceleration rate of 10ft/s^2 , vehicle approaching speeds is 35 mph (5 mph over the speed limit), The calculated Yellow change interval equals 3s

D. Evaluation of Traffic Signal Visibility

There are no visual obstructions to the signal heads on both of the southbound & northbound direction of SR 509/ Marine View Dr. The longitudinal grades are relatively flat on both approaches. The visibility to the signal meets the required MUTCD standards (Table 4D.12/ Section 4D.12)



Figure 2: Southbound approach, looking south



Figure 3: Northbound approach, looking north

E. Review of Intersection Signs

The signs and markings at the intersection are in good condition and meet the required standards. No other conflicts exist.